Promoting Best Practices for effective Hands-on and Distance Learning Programs in future for Space Science and Technology Education

Dr. A. Senthil Kumar
Director, CSSTEAP

Meeting of Directors of Regional Centres (UN affiliated)
Vienna, Austria, June 13-14, 2017
www.cssteap.org
Topics

Introduction:
Multi-disciplinary Space Science & Technology Education (SSTE) – challenges in training

Best Practices:
• Instructional System Design in framing training curriculum
• Lessons learnt on in-person training
• Experience from Distance Learning Programs
• Post training Feedback from Alumni and way forward
• Multi-cultural / multi-ethnic environment - challenges

Conclusions
SSTE - Convergence of Technologies

- Action
- Analyst Exploitation & Knowledge Discovery
- Human-Computer interaction, Visualization, Machine Learning
- Smart Databases
  - CBIR, Intell. Agents, Semantic Mining
- Information Fusion
  - Multi-source, Multi-INT (signals, Human, etc)
- Automated Processing
  - ATR, Co-registration, Change Detection, Target Tracking
- Remote Sensing Source
  - PAN, MS, Hyperspectral, SAR, INSAR, LIDAR, Gravity, Mobile, GPS, GNSS, wireless networks, ...

Integrated Solutions for “Fitness for Purpose” or “Analysis Ready Data (ARD)”
Challenges in SSTE training

• Ever evolving technologies:
  ➢ Advanced sensors,
  ➢ innovative agile platforms,
  ➢ intelligent processing,
  ➢ multi-sources integration strategies (LEO/GEO, AB, GT,..)
  ➢ Ready to Analyze data with high reliability,
  ➢ Higher demand for specialized courses, ...

• Challenges in
  ➢ Getting suitable “Trainers” with strong expertise and working knowledge;
  ➢ Equipping lab. and field data such advanced sensors / platforms/software tools for demonstration and hands-on
Possible Solutions for SSTE training Challenges

• Cross-border Education
  - Support, promote, stimulate and initiate cross-border joint education programs (JEPs), dissemination efforts such as: seminars, tutorials, workshops, symposia, e-bulletins and other mechanisms & tools,
  - Cooperating with other Geo-societies on issues of: common themes and goals; mobilizing lecturers; adopting efficient ways for planning and running the seminars; and how to share and cut expenses;
  - Cooperate with regional universities, organizations, and societies in order to stimulate them to cooperate, provide facilities, share local know how and offer a base for future further cooperation;

• Webinars/Outreach programs with global expertise
  - Promotion of web-based resources with free access, ......
Webinar Series: SAR Data Processing and Applications
Total No. Of Participants: 252 from 53 Countries (Apr.17-Jun 9, 2017)

Occupation
- Students: 66.90%
- Professionals: 28.90%
- Others: 4.20%

Mail/ Female Ratio
- Female: 32.90%
- Male: 67.10%
## Webinar Series: SAR Data Processing and Applications

Total No. Of Participants: 252 from 53 Countries *(Apr.17-Jun 9, 2017)*

<table>
<thead>
<tr>
<th>Webinar No.</th>
<th>Webinar Topic</th>
<th>Instructors</th>
<th>No. of Participants</th>
<th>No. Of Countries</th>
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<tbody>
<tr>
<td>W1</td>
<td>Overview of SAR Remote Sensing</td>
<td>Mr. Shashi Kumar</td>
<td>135</td>
<td>43</td>
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<tr>
<td>W2</td>
<td>SAR Data Format, SAR Missions and data access</td>
<td>Dr. Magdalena</td>
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<tr>
<td>W3</td>
<td>SAR data processing</td>
<td>Mr. Shashi Kumar</td>
<td>96</td>
<td>36</td>
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<tr>
<td>W4</td>
<td>Basics of SAR Polarimetry and Interferometry</td>
<td>Mr. Shashi Kumar</td>
<td>99</td>
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<tr>
<td>W5</td>
<td>SAR Remote Sensing for Geological Applications</td>
<td>Dr. RS Chatterjee</td>
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<td>W6</td>
<td>SAR Remote Sensing for Forest, crop and soil moisture</td>
<td>Dr. H. McNairy (Agrifood Canada)</td>
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<td></td>
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<td>Dr. H. Padaliya (Agrifood Canada)</td>
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<td>W7</td>
<td>SAR Applications in Snow and Glacier Studies</td>
<td>Dr. Praveen Thakur ISRO</td>
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<tr>
<td>W8</td>
<td>SAR data for Flood Mapping</td>
<td>Mr. Chris Stewart Dr. Erika Podest</td>
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<td>32</td>
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# Webinar on Disaster Management - 2015

<table>
<thead>
<tr>
<th>NAME</th>
<th>INSTITUTION</th>
<th>ROLE</th>
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<tbody>
<tr>
<td>Hilcéa Ferreira</td>
<td>INPE</td>
<td>Coordinator/Instructor</td>
</tr>
<tr>
<td>S.P. Aggarwal</td>
<td>IIRS/ISRO</td>
<td>Coordinator/Instructor</td>
</tr>
<tr>
<td>Marie-Josée Bourassa</td>
<td>CEOS CEO</td>
<td>Contributor</td>
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<tr>
<td>Kim Holloway</td>
<td>CEOS SEO</td>
<td>Contributor/Instructor</td>
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<tr>
<td>Guy Aube</td>
<td>CSA</td>
<td>Contributor</td>
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<tr>
<td>Antonios Mouratidis</td>
<td>ESA</td>
<td>Instructor</td>
</tr>
<tr>
<td>Ivan Petiteville</td>
<td>ESA - WGDisasters</td>
<td>Contributor</td>
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<tr>
<td>Jesus A. G. Bernal</td>
<td>INAOE/CRECTEALC</td>
<td>Contributor</td>
</tr>
<tr>
<td>Claudia Lucaccioni</td>
<td>INPE</td>
<td>Moodle Tutor</td>
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<tr>
<td>Daniel Vila</td>
<td>INPE</td>
<td>Instructor</td>
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<tr>
<td>Alberto Setzer</td>
<td>INPE</td>
<td>Instructor</td>
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<tr>
<td>Fabiano Morelli</td>
<td>INPE</td>
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<tr>
<td>Laercio Namikaya</td>
<td>INPE</td>
<td>Instructor</td>
</tr>
<tr>
<td>Su-Yin Tan</td>
<td>University of Waterloo and ISU</td>
<td>Instructor</td>
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<tr>
<td>Ana Prados</td>
<td>NASA</td>
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<tr>
<td>Amita Mehta</td>
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<tr>
<td>Nancy D. Searby</td>
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<td>Phila Sibandze</td>
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<tr>
<td>Lorant Czaran</td>
<td>UNOOSA</td>
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<tr>
<td>Brenda Jones</td>
<td>USGS - WGDisasters</td>
<td>Instructor</td>
</tr>
<tr>
<td>Eric Wood</td>
<td>USGS</td>
<td>Contributor</td>
</tr>
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</table>

Duration: April 6 – May 31, 2015
Feedback: WGCapD & WG-Disasters DE Course

1. Data handling and software skill
   • Provision of some assignments to work on using the software discussed in the Moodle.
   • More practical examples and tutorials on software used to get required results that matter.
   • Further demonstrations & techniques in software used for analyzing data.
   • Practical classes on programming TerraMA².
   • A module that provides an introduction to image processing.

2. Data Access
   • Include real processing of data instead of results. Demonstrate how to derive maps and products.

3. E-resources and Books
   • Provide additional reference resources and/or e-books.

4. Language
   • Can we go for more languages of instructions?
Three Stages in Capacity Building:

Before
- What is the best way to accomplish
- To whom are we trying to accomplish
- How do we measure that it is the best way

While
- How to quantify the performance of trainers, trainees, material and methodology..

Post
- What measures to be taken for improvement..
- What new topics for future training needs..
- Alumni Feedback and suggestions
- How to enhance retention of knowledge gained
### 1) SAR / Geoinformatics Workshops

<table>
<thead>
<tr>
<th>Process Context</th>
<th>Sensors &amp; Data Acquisition</th>
<th>Processing &amp; Modeling</th>
<th>Storage &amp; Retrieval</th>
<th>Dissemination &amp; Use</th>
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<tr>
<td>Application Domain</td>
<td>Second Priority</td>
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</tr>
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<td>Institutional Setting &amp; policy</td>
<td>Third Priority</td>
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### 2. Disasters Management Programs

<table>
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and so on ......
<table>
<thead>
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<th>PURPOSE</th>
<th>PRIME FOCUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resource Development</td>
<td>Supply of Technical and Professional Personal (K12, UG/PG students, Teachers)</td>
</tr>
<tr>
<td>Organizational Strengthening</td>
<td>Strengthen Govt./NGOs 1. Management Capacity on Geo-ICT solution (systems, processes) 2. Strategic Management Principles (professional, field managers, trainees...)</td>
</tr>
<tr>
<td>Institutional Strengthening</td>
<td>Strengthen Capacity of Organizations to 1. Develop appropriate Mandates &amp; Modus Operandi 2. Legal &amp; Regulatory Frameworks (Decision makers, Local &amp; National Govt. / NGO Administrators, Law and Policy staffs, ...)</td>
</tr>
</tbody>
</table>
Instructional Systems Design (ISD)

- **Definition**: Practice of creating "instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing."

- **Purpose**: Determining the state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition.

- There are many instructional design models but many are based on the **ADDIE model** with the five phases:
  - Analysis
  - Design
  - Development
  - Implementation
  - Evaluation
ADDIE Model – in detail

ANALYSIS - more general

• Gather all information which includes:
  - Instructional objectives, or what you wish to teach
  - Who the learners are, their abilities and circumstances
  - The setting and model of information delivery (online, classroom, workplace?)
  - Teaching considerations and barriers to learning
  - The timeline you’re working with

After Analysis .. Learning Solutions → DESIGN

- Short/Long Course
- Delivery mode (online, onsite)
- Practical (Hands-on)/Theoretical
- Planning Milestones
- Deliverables
- Competencies
- Expected Outcomes
- Assessment design
# ADDIE Model ... in a nutshell

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity Description</th>
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<tbody>
<tr>
<td><strong>Gain Attention</strong></td>
<td>• Present the learner with an introductory activity that engages him/her</td>
</tr>
<tr>
<td><strong>Inform objectives</strong></td>
<td>• Present the learner with learning objectives</td>
</tr>
<tr>
<td><strong>Stimulate recall of prior learning</strong></td>
<td>• Present the learners with an experience that stimulates their prior knowledge</td>
</tr>
<tr>
<td><strong>Present Stimulus</strong></td>
<td>• Present the learner with content materials</td>
</tr>
<tr>
<td><strong>Provide Guidance</strong></td>
<td>• Present the learner with examples</td>
</tr>
<tr>
<td><strong>Elicit Performance</strong></td>
<td>• Present the learner with practice activities</td>
</tr>
<tr>
<td><strong>Provide Feedback</strong></td>
<td>• Present the learner with practice and feedback</td>
</tr>
<tr>
<td><strong>Assess Performance</strong></td>
<td>• Present the learner with post-assessment items</td>
</tr>
<tr>
<td><strong>Enhance Retention &amp; Transfer</strong></td>
<td>• Present the learner with resources that enhance retention &amp; transfer of knowledge</td>
</tr>
</tbody>
</table>
The “in-person” training approach: CSSTEAP experience
Facilities Provided to Participants

- Monthly Fellowship
- International travel support
- Single Occupancy Hostel Accommodation with kitchenette facilities, Gym, Sports
- 24x7 digital Library
- Medical facility
- Tuition fee, course fee waived off
- English Coaching
- Live lectures & video recording
- Technical Visits

- Symposium/Seminars participation
- Field visits / Institutional visits
- International Experts / Lectures/ Tutorials
- Satellite data (India / International)
- Books/ Project Allowance / Field work allowance
- Other administrative expenses (Visa, baggage allowance etc.)
Educational activities in and out-side the campuses
Cultural Activities – “Make feel at home”
CSSTEAP: Structure of “in-person” training

PG Program: Skills Development + Education + Research

- Lectures: 16%
- Practicals/Demos/Project Work: 60%
- Field Work: 15%
- Self study/Seminars/Examination: 9%

Total Hours: 1200+60 (Exams)
75% - Hands-on

(Best Practice #3)
Focusing on Special Themes

**PG Courses till May 30, 2017 (Education)**

- RS GIS: 422
- SATCOM: 164
- SATMET: 164
- SAS: 109
- GNSS: 9

Total participants: 862

Short-courses attract professionals!

**Short Courses till May 30, 2017 CB @ Skills Development**

- RS GIS: 602
- SATCOM: 133
- SATMET: 25
- SAS: 41
- DISASTER: 44
- SSM: 111

Total participants: 956

Selection of Short-courses themes – critical for higher acceptance
Special Courses for Skills Development

- **NWP**: Weather Forecasting using **Numerical Prediction Models** during April 18-May 17, 2016 (23 participants from 7 countries)

- **AFEA**: Advances in Geospatial Tools in Forestry & Ecology Applications during May 23 - June 21, 2016 (20 participants from 9 countries)

- **DDLA**: Disaster Damage and Loss Assessment in Natural Heritage and Cultural Sites using Geospatial Techniques, September 11 – October 2, 2016 (24 participants from 11 countries).

- **DRDA**: Disaster (post Earthquake) Rapid Damage Assessment was jointly conducted with UNOOSA, UN-HABITAT, and UN-SPIDER designed and developed the course curriculum and conducted the training course from 28 March to 2 April 2017 at Yangon, Myanmar. A total of **44 participants** from 16 disaster management agencies and stakeholder departments participated in the training programme.

- **UAS and its applications with special emphasis to DRR** (23 participants from 11 countries, June 12-23)

- **LIDAR RS and its applications** (completed, May 15-26, 22 participants from 8 countries)
CB @ Educational + Research

- Award of PG Diploma by CSSTEAP Completion of 9 month PG course curriculum
  - One year follow-up project in home country for academic requirement of M.Tech. research
  - Submission and evaluation of M. Tech. thesis by internal & external experts.
  - Award of M. Tech. degree by Andhra University, India. About 143 received M.Tech. degree till date.
  - CSSTEAP offers 1 Yr. Fellowship in India to meritorious students for M.Tech. Research
Remote Sensing & GIS

- **Advance RS & data analysis**: High resolution, microwave, Hyper-spectral, LIDAR and Planetary science mission data analysis & processing
- **Natural Disaster Monitoring and Management**: Landslide risk analysis, Soil erosion modeling & nutrient loss, Forest fire risk zonation, Flood modeling, etc.
- **Modeling Earth processes**: LULC change prediction, Crop & forest productivity, Ecological Niche, Hydrological & hydro dynamic, Debris flow, Ground water modelling, etc.
- **Advance GIS**: 3D GIS, Spatial Data Quality Uncertainty, Geoweb, LBS, SDI, Network analysis.

Satellite Communications

- **Communication Techniques**: Modulation and Coding, Communication link design, Satellite data network,
- **Earth Station Technologies**: Terminal development, Receiver technologies,
- **Signal Processing**: Compression techniques,
- **Antenna Systems**: Design mechanism and realization techniques

Satellite Meteorology & Global Climate

- **Meteorology**: Extra Tropical, Weather Systems, Tropical Weather Systems, Monsoon,
- **Image processing and interpretation**:
- **Advanced concepts in Satellite meteorology**: Geophysical parameter retrieval, Application of satellite derived parameters, Satellite data assimilation in NWP,
- **Global Climate Environment**: Short term climate variability, long term climate change,

Space & Atmospheric Science

- **Solar physics, Astronomy, Space weather**: solar X-ray impact on ionosphere; studies of satellites of various planets; mesosphere and thermospheric airglow emissions; plasma temperature density; solar wind, solar radiation, comets, Novae and Glonular clusters; binary stars; space weather.
- **Atmospheric Science**: satellite retrieval of aerosols, ozone, ionospheric irregularities, satellite observations of tropical cyclones; modelling of atmospheric chemistry of aerosols.
Exposure of Advanced Research to Course participants in Symposia and workshops

Symposium

• 25 Course participants of RS GIS, SATCOM and GNSS PG courses participated in Asia Pacific Remote Sensing organized by SPIE during April 4-7, 2016 at New Delhi.

• 22 CSSTEAP Course participants of RS GIS course which includes 2 M.Tech students have participated in ISRS Symposium & National Convention during Dec. 7-9, 2016 at Dehradun.

Tutorials

• Above 22 participants were also attended tutorials on UAV, Hyperspectral RS, Microwave RS, Watershed, Health GIS, Close Range photogrammetry based on their choice.

During the Course …

- **Overall Objective of the Course Achieved**
  - Excellent: 79%
  - Very Good: 20%
  - Good: 1%
  - Average: 0%
  - Poor: 0%

- **Relevance of the Pilot Project**
  - Excellent: 74%
  - Very Good: 18%
  - Good: 6%
  - Average: 2%
  - Poor: 0%

- **Physical Facilities (Class Room, Computer Room and Lodging)**
  - Excellent: 91%
  - Very Good: 9%
  - Good: 0%
  - Average: 0%
  - Poor: 0%

After the Course …

- **How CSSTEAP Course Benefitted to your current job**
  - Highly Benefitted: 91%
  - Moderately: 9%
  - Not at all: 0%

- **Current Organization**
  - University: 31%
  - Research Institute: 12%
  - Government Organization: 50%
  - NGO: 2%
  - Private: 3%
  - Others: 2%

- **Do you need any Refresher Course**
  - Yes: 91%
  - No: 9%
CSSTEAP Alumni Meets

Alumni meet at Kathmandu, Nepal on October 6, 2010

Meeting with the CSSTEAP alumni in Colombo, Sri Lanka on October 21, 2011

CSSTEAP Alumni Meet in Thimpu, Bhutan on November 15, 2011
CSSTEAP Alumni Meets

Colombo, Sri Lanka
October 20, 2016

Recommendations:
• Short Course on UAS
• Short course on Lidar
• Refresher course
Observations & Comments from Alumni Meets

Major observations:

• Courses were useful in career development and improving profession aptitude in their organizations/institutions;

• Alumni have taken lead role as team leader and are assigned important projects to handle based on the PG diploma / M.Tech degree obtained from CSSTEAP.

Major recommendations:

• To organize refresher courses in emerging applications

• To organize special short courses jointly with institutions in their country on Microwave Remote Sensing, Disaster Risk Reduction; short-range forecasts; Monsoon variability; Hazard & risk analysis in their country so that more participants can take benefit of the programme.
Experience from *Distance Learning* Programs
ISRO Outreach Programme Initiative:

Live & Interactive (classrooms model rather than webinars)
Network for Education & Skills Development

Institutions within India

<table>
<thead>
<tr>
<th>Type of Institute</th>
<th>Number</th>
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<td>University/Institute/College</td>
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<tr>
<td>Central Govt. Ministry/Department</td>
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<tr>
<td>State Govt. Ministry/Department</td>
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<tr>
<td>Industry/Corporate</td>
<td>9</td>
</tr>
<tr>
<td>other</td>
<td>12</td>
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</table>

National Distribution of IIRS Outreach network

600+ Institutions in India are networked
Institutional Networking Outreach Program

YEARWISE DISTRIBUTION OF PARTICIPANTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of participants</th>
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<tr>
<td>2007</td>
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<tr>
<td>2008</td>
<td>915</td>
</tr>
<tr>
<td>2009</td>
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<td>2013</td>
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<tr>
<td>2014</td>
<td>5655</td>
</tr>
<tr>
<td>2015</td>
<td>8597</td>
</tr>
<tr>
<td>2016</td>
<td>14104</td>
</tr>
</tbody>
</table>

Current employment status of users

- Working: 62.6%
- Not-Working: 32.3%
- Student: 3.1%

Impact of IIRS outreach programme in career growth of the participants

- Yes: 82.4%
- No: 13.7%
- Upto Some Extent: 3.9%
- Not at all useful: 0.0%

Impact based on online Survey
IIRS Outreach Programme

Live & Interactive courses

YEAR WISE NUMBER OF PROGRAMMES

From 2016 onward more focus is on:
• Theme based user centric courses;
• National Project oriented programmes;
• Short duration special courses;
• Monthly Webinar series.
IIRS Outreach Programme

Live & Interactive classrooms- Contents Delivery

https://www.youtube.com/channel/edusat2004
Comparison of Women Participation in ISRO-DLP & in person CSSTEAP

Outreach (ISRO)
- Overall: 34%
- Basic DL course: 37%
- Theme Specific DL: 32%

In-person (CSSTEAP)
- CSSTEAP (Overall): 31.52%
- CSSTEAP (Long-term): 32.25%
- CSSTEAP (Short-term): 30.56%
IIRS Outreach Programme – Model 2

IIRS e-learning Initiatives- English & Hindi

- e-learning courses are self-paced and learner centric;
- The syllabus of the courses are as per latest developments and trends in geospatial science and technologies;
- Learning is made available through online interactive 2D and 3D animations, audio, video for practical demonstrations, software operations with free data application
- Registrations are Free and Open to all at http://elearning.iirs.gov.in

Available courses:
- Comprehensive certificate course on Remote Sensing and Geo-information Science- 4 Months duration.
- One month fundamental certificate courses on Remote Sensing, Photogrammetry, GIS, Digital Image Processing

Uniqueness:
- Learner centric teaching methodologies implemented;
- Self paced learning;
- Learning anywhere, anytime;
- Interactive 2D and 3D animations.
DLP: Internet Based e-Learning Courses

- e-learning courses are self-paced and learner centric;
- The syllabus of the courses are as per latest developments and trends in geo-spatial science and technologies;
- Learning is made available through online interactive 2D and 3D animations, audio, video for practical demonstrations, software operations with free data application
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<td>Photogrammetry and Cartography</td>
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<td>Digital Image Processing</td>
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<tr>
<td>Geographical Information System</td>
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<tr>
<td>Global Navigation Satellite System</td>
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<tr>
<td>Customization of Geospatial Tools</td>
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<tr>
<td>Applications of Geospatial Technologies</td>
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- One month fundamental certificate courses on Remote Sensing, Photogrammetry, GIS, Digital Image Processing

Uniqueness:
- Learner centric teaching methodologies implemented;
- Self paced learning;
- Learning anywhere, anytime;
- Interactive 2D and 3D animations.
### Hindi Version of IIRS e-learning courses-

https://elearning.iirs.gov.in/hindi/

<table>
<thead>
<tr>
<th>Details</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learners (foreigners)</td>
<td>2575 (214)</td>
</tr>
<tr>
<td>Total learners registered for certificate</td>
<td>783</td>
</tr>
<tr>
<td>Participants with fee payment</td>
<td>143</td>
</tr>
<tr>
<td>Number of Certificates issued</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total e-learning Participants</strong></td>
<td><strong>3358</strong></td>
</tr>
</tbody>
</table>
ISRO Digital Knowledge Repository

Select Your Ministry: Urban Development
Select Level: Decision Maker
Select Contents Type: Lecture Videos (General)

Space enabled products & services for disaster
Space based inputs for Decentralized Planning
Bhuvan and its application to informed decision making
ISRO Bhuvan Geoportal and its components
Use of GIS and space applications in development and administration
Application of RS and GIS for Natural Resources
Challenges in multi-cultural / multi-ethnic learning environment

• Multi-cultural environment creates obstacles and opportunities for research and learning.

• Students/trainees come from different higher education systems each with diverse missions, history, and societal context.

• Learning and teaching styles differ depending on cultural identity and heritage.

• **Challenge** - how to bridge differences in culturally dependent learning and teaching styles related to cultural identity and heritage in a time bound training.

• This calls for specific feedback Questionnaire that helps to understand how the students feel about current courses offered.
Survey with International Participants: Questionnaire

A. Education/ Academic (19 queries)
   • Are you able to follow the rigor in Mathematics/Physics w.r.t to your earlier education?
   • Do you feel this course is more technology or Application oriented?
   • Do you feel that the field tours/ excursion were adequate?
   • How do you rate the structure and organization of the course?
   • How do you compare yourself in a classroom ambiance in your country vis-à-vis at IIRS?
   • How do you rate your proficiency of English?

B. Benefit of the courses (08 queries)
   • Have you acquired information and knowledge that is new to you?
   • The content of this course matched announced objectives?
   • Did you had opportunities to discuss issues of interest with other participants?
   • Would you recommend this training to your colleagues?
   • Were there any unexpected areas of learning for you?

C. General Ambience (12 queries)
   • Was the class composition adequate and did not hinder the learning process? (Yes/No)
   • Participants should be only from the same geographical region? (Yes/No)
   • Multi-ethnic class composition does not affect the learning process? (Yes/No)
   • Educational background diversity does not affect the learning process? (Yes/No)
   • How effective are your general working practices e.g. time management?
Survey analysis of International Participants

Figures in %

- **Education/Academic**
  - To Great Extent: 50%
  - To Large Extent: 39%
  - To Moderate Extent: 14%
  - Not at all: 7%

- **Usability**
  - To Great Extent: 42%
  - To Large Extent: 22%
  - To Moderate Extent: 9%
  - Not at all: 2%

- **Amenities/Infrastructure**
  - To Great Extent: 31%
  - To Large Extent: 22%
  - To Moderate Extent: 4%
  - Not at all: 2%

- **Others**
  - To Great Extent: 44%
  - To Large Extent: 25%
  - To Moderate Extent: 22%
  - Not at all: 9%

79 participants (participated) from 22 countries in 5 Courses (IIRS-ITEC and CSSTEAP-RS&GIS, SAS, SATMET & Short Course on LiDAR)
79 participants (participated) from 22 countries in 5 Courses (IIRS-ITEC and CSSTEAP-RS GIS, SAS, SATMET & Short Course on LiDAR
### Ability to follow Technology (M+P) of the Course

<table>
<thead>
<tr>
<th>Score (%)</th>
<th>Central Asia</th>
<th>Africa</th>
<th>South Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great</td>
<td>19</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>Large</td>
<td>46</td>
<td>59</td>
<td>49</td>
</tr>
<tr>
<td>Moderate</td>
<td>33</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>Poor</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OK</td>
<td>64</td>
<td>92</td>
<td>79</td>
</tr>
<tr>
<td>To be improved</td>
<td>36</td>
<td>8</td>
<td>21</td>
</tr>
</tbody>
</table>

### Apprehend the lectures in English

<table>
<thead>
<tr>
<th>Score (%)</th>
<th>Central Asia</th>
<th>Africa</th>
<th>South Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great</td>
<td>19</td>
<td>63</td>
<td>43</td>
</tr>
<tr>
<td>Large</td>
<td>74</td>
<td>51</td>
<td>57</td>
</tr>
<tr>
<td>Moderate</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OK</td>
<td>93</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Felt requirement of Translator

<table>
<thead>
<tr>
<th>Score (%)</th>
<th>Central Asia</th>
<th>Africa</th>
<th>South Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great</td>
<td>6</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Large</td>
<td>3</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>33</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Not at all</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>YES</td>
<td>56</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>No</td>
<td>80</td>
<td>44</td>
<td>81</td>
</tr>
</tbody>
</table>
Summary of Best Practices for effective training in Space Science & Technology education

1. Cross border Education with sharing global expertise
2. Instructional Systems Design (ADDIE) for curriculum planning
3. Greater percentage on Hands-on in “in-person” training
4. Specialized short courses for skills development programs
5. Advanced research with field experiments as part of higher education
6. Exposure to State-of-art knowledge thro’ Symposia & W/S
7. Alumni feedback – post training to learn effectiveness of training undertaken – and future course recommendations
8. Institutional networking for Interactive distance learning
9. Encouraging women participation in all programs
10. Internet based e-learning courses for different time zone participation
11. Digital Knowledge Repository for record and archival of teaching material
12. Handling multi-cultural/multi-ethnic learning through survey analysis
Thank you for your kind attention

Q & A